

Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

II. Some Remarks on the Allowances to be made in Astronomical Observations for the Refraction of the Air. By Dr. Edm. Halley, R. S. S. Astronomer Royal. With an accurate Table of Refractions.

ERE the Medium of our Air much more in Quantity, or the Force of Gravity much greater than it is, or in a word, were the Refractive Power of the Air much more sensible than we find it. nothing could have been a greater Impediment to Discoveries in Astronomy: For all Objects appearing by Refraction higher than really they are, till fuch time as the Laws and Quantity of that Refraction had been ascertained, it would have been impossible to have been secure of the true observed Place of any Coelestial Object. But as it falls out to be so little, that none but nice Instruments can perceive its Effects, it was not discovered to be at all. till Bernard Walther's time, about the Year 1500: nor brought to any fort of Rule till Tycho Brahe; nor ascertained, till our worthy President made the first accurate Table thereof: The Curve which a Beam of Light describes, as it approaches the Earth, being one of the most perplext and intricate that can well be proposed, as Dr. Brook Taylor in the last Proposition of his Methodus Incrementorum has made it evident. By this Table it follows that the ratio

of the Sine of the Angle of Incidence to that of the Refracted Angle, encreasing as the Beam approaches, makes a very notable difference in the place of an Object near the Horizon: but in Objects that are much elevated, the Refractions become small, and their Differences scarce exceed a Second per Degree; so that they are sufficiently the same, as if the Incident and Refracted Angles were on the Surface of a Sphere of Air of the same uniform Density close ad-

joyning to the Eye.

When therefore the Stars are twenty degrees or upwards elevated above the Horizon, we may take it for granted, without sensible Error, that the Sines of the true and apparent Distances from the Vertex: are in the same constant natio. Hence it will appear that the Distances of all the Stars are seen less than they really are, in whatever position they are taken, and that not less than a Second per Degree of the distance; that is, a distance of 30 degrees, for example, is contracted at least so many seconds, and one of 60 gr. no less than a Minute, if the distances be taken by an instrument that is truly divided. So that when Mr. Hevelius, to shew the exactness of his Observations, brings eight Distances, as taken by his Sextant, which exactly compleat the Circle, both in Longitude and Right Ascension; the consequence is really quite opposite to his Design: for if those distances were the true ones, they being all contracted by appearing through a refracting Medium. the Sum of the eight differences of both Longitude and Right Ascension, ought to fall short of a whole Circle or 360 degrees by at least fix minutes; so that I am inclined to believe that the fixty degrees of Mr. Hevelius's Sextant wanted about a Minute of its true quantity. Such

Such an allowance as this may perhaps be a proper Expedient to avoid accounting for Refraction in coelectial Observations, provided the Objects be nearly parallel to the Horizon, or at a good height above it. For all distances of Stars are contracted by Refraction, when they are parallel to the Horizon, by the same constant quantity, be they high or low, that is by about one Second per Degree; the Chords of the Arches of the real and visible distances being always in the same ratio as is the Sine of the Angle of Incidence to that of the refracted Angle.

And this is the case wherein the Refraction of the Air does least affect the distances of the Stars, which Distances are still more and more contracted, as they are nearer to a perpendicular Situation: So that a Diftance, for Example, of thirty Degrees loses but half a Minute in a horizontal Site; but if the one Star be 20 degrees high, and the other fifty, it will be leffened by above three times as much, or by 1 m. 41 fec. If the one be 20 and the other 60 Degrees high. the same distance will appear less than 30 Degrees by about one Minute; the difference still decreasing as the Objects are more elevated above the Horizon. But in all cases to account for the effect of the Refraction upon the Distances of the Stars, requires, besides some Trigonometrical Work, the help of the afore-mentioned Table, which I here subjoyn for the use of the Curious, such as I long since received it from its Great Author; it having never yet, that I know of, been made publick.

B b 2

(172)

Tabula Refractionum Siderum ad Altitudines apparentes.

J	-67	1 Alt.	Retra-	4 015	0.6
Alt.	Refra-		Refra-	Alt.	Refra- ctio.
Appar.	.ctio.	Appar.		Appar. deg.	ctio.
deg. m.	m. iec.	deg.		deg.	m. fec.
0 0	33 45	16	3. 4.	46	0 52
1 0 15	30 24	17	2 53	47	0 50
0 30	27 35		2 43	47 48	0 48
0 45	25, 11	19	2 34	49	0 47
1 0	23 7	20	2 26	50	0 45
1 15	21 20	21	2 18	51 52 53	0 44
· 1 30	19 46	22	2 11	52	0 42
1 45	18 22	23	2 5 I 59	53	0 40
2 0	17 8	24	I 59	54	0 39
2 30	15 2	25	I 54	54 55	0 38
3 0 3 30 4 0 4 30 5 0	13 20	26	I 49	56	0 36
3 30	IÍ 57	2 7 2 8 29	I 44	57 58	0 35
4 0	11 57	28	I 40	58	0 34
4 30	9 50	29	I 36	59 60	0 32
5 0	9 2	30	I 32		0 31
5 30	$\begin{array}{c c} 9 & 2 \\ \hline 8 & 21 \end{array}$	31 32 33	1 28	61	
5 30 6 0 6 30	7 45	32	I 25	62	0 30 0 28
6 30	7 14	33	I 22	63	0 27
	6 47	34	1 19	64	0 26
7 0	6 22	34 35	1 16	63 64 65	0 25
8 0	6 0	36	I 13	66	0 24
8 30	5 40	37	III	67	0 22
9 0	5 22	37 38	1 8	68	0 22
8 0 8 30 9 0 9 30 10 0	5 6	39	1 6	67 68 69	0 21
10 0	4 52	40	1 4	70	0 20
11 0	4 27	41	I 2	71	0 19
12 0	4 5	42	1 0	72	0 18
13 0		43	0 58	73	0 17
14 0	3 47 3 31	44	0 56	74	0 16
15 0	3 17	45	0 54	74 75	0 15
J-					